I have often observed what seemed to be resting forms, but have no proof that these were not dead organisms. They were completely round and in the fresh specimen no flagella or tail could be made out. There was no clear marginal zone as Lynch describes. The organisms undoubtedly are greatly changed in both size and contour in the process of fixing and staining. During life its extreme activity baffles any attempt at accurate drawings of all parts. This probably accounts for the great number of species described by different workers. In the same coverslip preparation, I have found organisms that meet all the requirements of typical trichomonas—three anterior flagella, undulating membrane and stiff, stubby, fixed tail, alongside of other organisms that make a good picture of the typical trichomastix with three anterior flagella and one recurrent flagellum not adherent to the body to form an undulating membrane. The tail is well marked and in some organisms has one or two well marked flagella. Such an organism has been recently described by Chatterjee (15) as the first appearance of the trichomastix in human pathology.

The technic of finding the trichomonad is simple. One or two small loopfuls of the specimen are mixed with a small drop of salt solution or warm tap water and placed under a cover-glass. Examine with the oil immersion lens. The preparation must be thin and if there are too many currents, the cover-glass should be margined with vaseline or any suitable oil. The stool does not need to be kept warm. The organisms will remain active at room temperature for several days.

We cannot claim any degree of success at culturing these organisms. The method of Ohira and Noguchi (16), inoculating salt solution with infected feces, and incubating has not been satisfactory. We are now using a normal saline filtrate of the stool of the host as media, with some promise of greater success but our results are too incomplete for publication.

No treatment thus far recommended is wholly successful. Most of the vaunted remedies are ameliorative but not curative. Calomel followed by a saline laxative gives the best temporary relief, but in about ten days time, a careful search will reveal the parasites again. It is therefore necessary to repeat treatment many times. Thymol in large doses has considerable value. Emetine and ipecac exert a helpful influence on most cases, if the patient's feelings may be taken as a criterion. Oil of chenopodium and turpentine are very helpful, enemata of kerosene, ichthyol, or allied substances have a marked beneficial effect, while those of methylene blue and sodium bicarbonate have about the same relative value as tap water. Eternal vigilance and variation mark the successful management of these cases in their present status.

In conclusion, I wish to emphasize:—

First, that intestinal flagellosis is relatively common in California.

Second, that their presence begets more pathology than is generally conceded.

Third, that their pathogenicity is not wholly manifested by dysentery, but rather more often by other signs of an absorptive toxemia.

Fourth, that our present methods of treatment are inadequate for a definitely manifested pathology.

Bibliography—Intestinal Flagellates.

1. Escomel, E. Sur la dysenterie a Trichomonas a Arequipa (Perou) Bull. Soc. path—exot. (1913), 6, 120.
2. Mello-Leitao—cited by Fantham, Stephens & Theobold, P. 624 (No. 13).
3. Derrieu et Reynaud. Dysenterie chronique a flagelle nouveau. Bull. Soc. Path. exot. (1913), 6, 120.
4. Rhamy, B. W., and Metts, F. A. Flagellate protozoa as an ethiologic factor of dysenteric diarrhea. Jour. A. M. A. (1916), 66, 1190.
5. Prentiss, Elliott C. Observations on certain protozoa infections of the digestive system. New Mexico Medical Jour. (1915), 208.
6. Chatterjee, G. C. Note on flagellate dysentery. Ind. Jour. Med. Res. (1917), 4, 393.
7. The Tissue—invasive Powers of the flagellated and ciliated protozoa with especial reference to Trichomonas intestinalis. A critical Review, by Frank G. Haughwout. The Philippine Jour. of So. B. Tropical Med. Sept. '18. Vol. XIII, No. 5, P217.
8. Protozoal Infections of the Intestines, etc., P. 492. Robert Pollock, M. D., and Rawson J. Pickard, M. D. Am. Jour. Med. So. April 1919.
9. Smithies, Frank. The occurrence of Trichomonas hominis in gastric contents with report of two cases. Am. Jour. Med. Sc. (1912), 144, 82.
10. Brumpt, E. Colite a Tetramitus mesnili (Wenyon, 1910) et colite a Trichomonas intestinalis Leuckart 1879. Blastocystis hominis n. sp. et formes voisines. Bull. Soc. Path. Exot. (1912), 5, 725.
11. Hadley Philip. The case of Trichomonas. Am. Nat. (1917), 51, 208.
12. Lynch. (Am. Jour. Trop. Dis. & Present, Med. II, p. 627). (N. Y. Med. Jour., May 1, 1915, C. I, p. 886).
13. Animal Parasites of Man. P. 55, Fantham, Stephens & Theobald. John Beale, Sons & Danielsson, Ltd. London, 1916.
14. Lynch, Kenneth M. Staining of Spores. Jour. Parasit. Vol. 3, 1917, p. 28.
15. Chatterjie, G. C. Indian Jour. of Med. Research, Calcutta, p. 217. Reprint Jour. A. M. A., Dec. 15, 1917, p. 2072.
16. Ohira, T., and Noguchi, 4, 1917. The cultivation of Trichomonas of the human mouth. Jour. Exp. Med., 25; 341.

A PLEA FOR THE EARLIER RECOGNITION OF SUBACUTE INFANTILE SCURVY.

LANGLEY PORTER, M. D., M. R. C. S. (Eng.), San Francisco, and W. E. CARTER, M. D., Los Angeles.

It is a popular lay notion which unfortunately has found its way into the medical mind that scurvy is rare in California. This belief is accentuated by the facts that the orange, a well known antiscorbutic, is a common fruit, and that most children of the State eat it frequently. An inquiry into the incidence of the disease shows this idea to be erroneous.

We have been able to collect from three San Francisco hospitals, from the records of a few of our pediatric friends and from our own, a series of thirty-nine cases which have occurred since July, 1917. For the most part, these represent the extreme cases that find their way into the hospitals and into the hands of the children's specialist. The majority of them present the well marked symptomatology of the florid type of scorbutus, viz., swollen and bleeding gums, hyperesthesias, subcutaneous hemorrhages, flexion of the thighs, pseudo-paralyses and swollen epiphyses due to subperiosteal hemorrhages. Among them however are

cases with less striking symptomatology, the "scorbute fruste" of the French, the "subacute infantile scurvy" of which Alfred Hess has written in this country. These cases are characterized by a symptomatology just as significant though not as spectacular as are the former. The writers are convinced that this type is much more common in California than is the florid type. We believe that the most of these cases are overlooked and that in reality many uncomfortable and crying babies are sufferers from subacute scurvy. Without a doubt, a spontaneous cure is often effected because the age incidence of the disease corresponds roughly with the time at which mixed feeding is commonly begun.

Mainly with the view of calling attention to this group of scorbutic cases, this paper is presented. California practitioners especially should be cognizant of the disease for there is no more classical presentation of the subject than that given by William Fitch Cheney of San Francisco in 1896 in the Boston Medical News.

In spite of the fact that when fully developed, the florid type of scorbutus presents an unmistakable clinical picture, many cases find their way into the hospitals with a previously made diagnosis of rheumatism although every physician knows that rheumatism rarely occurs during the first and second years of life. This fact is all the more surprising when one considers how rich the literature on the subject has been ever since the first description of the disease was presented to the profession by Thomas Barlow in 1883.

Descriptions of scurvy in the adult first appeared in the earliest medical writing. The Roman armies were afflicted with it. It was one of the disabling factors of military and exploratory expeditions until the arts of canning and refrigeration put an end to it by providing foods other than in the dried state. It is the merit of a Swedish physician, Ingerslev in 1873, first to have caught the idea that babies might be subject to the disease. In 1878, Cheadle in the London Lancet described three cases. These reports initiated an interest in the subject, and in 1883 Barlow reviewed 31 cases that had been reported as "acute rickets" but which he believed were acute infantile scurvy. In 1894, before the Royal College of Physicians in one of the Bradshaw Lectures, he carefully reviewed the literature and reported cases of his own with the result that the disorder has since been known as "Barlow's Disease."

The etiology of infantile scurvy has excited much discussion. In 1902, Sill reported upon 179 infants fed on boiled or pasteurized milk among whom 97 per cent. showed signs of either rickets or scurvy or both. The American Pediatric Society undertook a survey and appointed a committee to investigate the subject. The committee made an exhaustive inquiry and in 1898 submitted a report which embodied a study of 379 cases. Their conclusion was that the disease "is due to a diet unsuitable to the individual" and that certain named proprietary foods seemed commonly causative. Beyond this, the committee refused to be bound. In 1907, in the Journal of Hygiene of Cambridge, the Scandinavian investigators, Holst, Frolich and Von Furst reported a series of experiments in which they fed guinea pigs on dried grains. The animals died within four to six weeks and showed at autopsy scorbutic changes. As a control they fed other guinea pigs on a starvation diet of cabbage, dandelion and carrots until they had lost 30% to 40% of their body weight. On post mortem these showed no indications that they had suffered from scurvy.

The literature of the last ten years is replete with discussions regarding the exact etiological factor involved, but beyond the general conclusion that scorbutus is due to the absence of some substance, (vitamin) found in fresh food, there is little known of the underlying cause. Baumann and Howard, in 1912, working on the metabolism of scurvy, found that during the course of the disease, the sulphur balance is sustained; that sodium and chlorine are retained when fruit juice is fed but that they are excreted in excess of intake before such treatment is instituted; and that calcium, potassium and magnesium are also retained during the period of treatment.

In order to determine the question which has been raised by McCollum regarding the possibility that putrefactive bacteria of the intestine might be causative agents of scorbutus, Torrey and Hess in 1918 did a series of experiments on guinea pigs which they fed on a diet that caused scurvy and later on antiscorbutic foods which cured the disease. The intestinal flora in both instances was that found in any diet rich in carbohydrates, viz., B. bifidus, B. acidophilus and a few streptococci and B. coli, mostly organisms antagonistic to putrefaction. They confirmed these experiments by observations on scorbutic infants and arrived at the conclusion that neither in animals nor in infants is scurvy due to an overgrowth of proteolytic intestinal microorganisms.

The fact that scurvy is known to develop in a small percentage of breast fed infants and in some fed on raw milk, leaves the question of an exact etiology open. But about one thing there is unanimity of opinion, and that is that the feeding of antiscorbutics, orange juice, tomato juice, potato and the like is always indicated and that these foods are equally valuable in the prevention and in the cure of the disease. Therefore a failure to advise mothers regarding the prophylactic use of such substances can never be justified.

The diagnosis of the most frequent, though least recognized form, is easy after a careful history has been taken and clinical observations made. The mother complains that the child is "fussy" and irritable and that it cries when she takes it up. There usually is no swelling of the epiphyses at this stage but it is probable that there is a history of easy bruising and there may be hemorrhagic spots somewhere over the body. One of our cases showed no other sign than a black and blue ring around the buttocks where a tightly pinned diaper had made pressure, except some tenderness referable to the bones. The diagnosis of subacute scurvy was justified because both symptoms cleared up promptly when the child was given orange juice

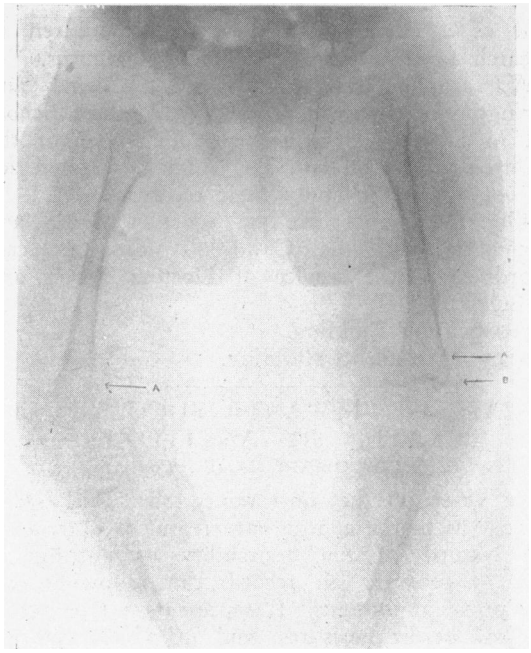

PLATE I
A—Subperiosteal hemorrhage.
B—Beginning bone deposit.

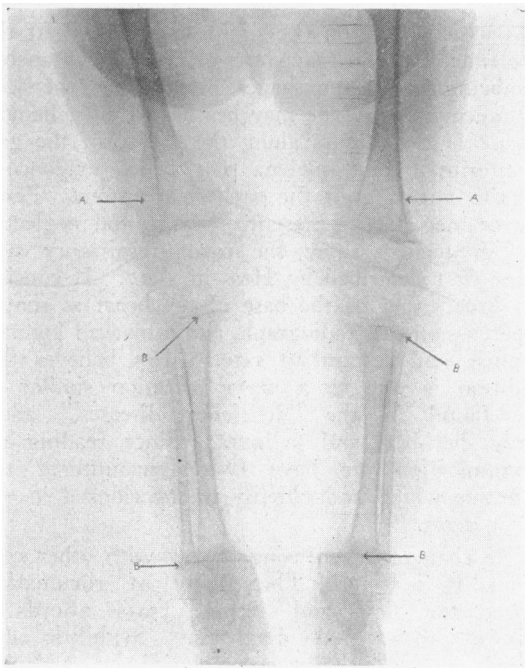

PLATE III
A—Marked bone deposit.
B—"White Line" of Frankel.

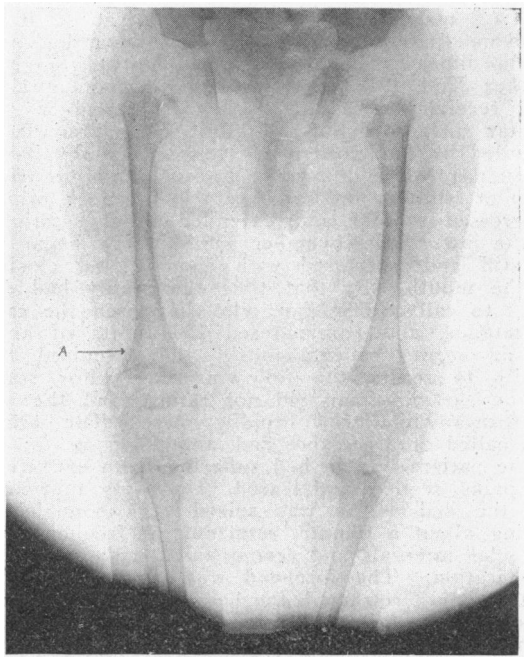

PLATE II
A—Layer of subperiosteal bone.

and potato cream—a therapeutic test which can easily be applied to all suspicious cases with an assurance that no harm will be done even if some other cause of tenderness and easy bruising be found. In the category of subacute forms may be placed several reported cases in which hematuria was the predominant or only symptom of the disease—a symptom which rapidly vanished when antiscorbutic foods were added to the dietary.

In this connection it is interesting to note that a disinclination to move the legs may be a symptom of that common disorder of female infants, cystitis. It also occurs in syphilitic involvement of the bones.

As in the fully developed florid form, a careful history will usually elicit the fact that the child has been fed on an overheated food. In cases developing in breast fed infants, the possibility of some definite constitutional distrubance on the part of the mother should be considered. The beginning of the disease is usually gradual. Close questioning will usually indicate that there was a period of anorexia, head sweating, pallor, anemia, restlessness and discomfort of varying degree before the onset of the alarming symptoms. The major symptoms appear with dramatic suddenness. The child seems to have become paralyzed, and after a few hours or days of pseudo-flaccid palsy, it assumes a characteristic dorsal position with flexion and outer rotation of the thighs, or if the upper extremities are affected a pseudo-palsy simulating the Erb type. Swellings appear at the region of the epiphyses. The most commonly affected are the lower epiphyses of the femur; next in frequency the lower epiphyses of the tibiae; after these the epiphyses of the hip joint and the upper epiphyses of the humerus. The swellings are due to hemorrhages by which the periosteum is raised causing great tenderness. Any epiphysis in the body may be the site of the hemorrhage. The growth cartilages of the vertebrae may be involved in the process and such cases have been mistaken for acute Pott's Disease. Hemarthroses are also found while such a bizarre occurrence as a hemorrhage under the periosteum of the orbit resulting in a unilateral proptosis which occurred in one of our cases has been cited by Debuys as occurring in some 10 per cent. of the 397 cases studied by the committee of the American Pediatric Society. Even before these major symptoms develop, an examination of the mouth may reveal spongy

gums which bleed on the slightest trauma. At the same time, the skin may show evidence of cutaneous or subcutaneous hemorrhages. As well as the skin, any mucous membrane may be the site of a hemorrhage. If this occurs along the course of the gastro-intestinal tract, melena may be in evidence—sometimes it is even the earliest symptom. Fever may or may not be present. Severe and neglected cases frequently show the cardio-respiratory syndrome first described by Hess in 1917. It consists of a broadening of the base of the heart as shown by percussion and radiograph, and a marked increase in pulse and respiration rate. Hess believes this condition is due to a nerve affection similar to that found in the "deficiency diseases," adult scurvy, beri-beri and pellagra. Since reading his communication we have twice encountered the syndrome which undoubtedly we overlooked in our earlier cases.

The chance of confusing scurvy with other conditions is remote. The rarity of rheumatism during the first and second years affords a sufficient differential diagnosis. Syphilitic epiphysitis is not usually accompanied by evidences of external bleeding, and the history and concomitant symptoms of lues may be elicited. Sarcoma is usually limited, at least during its earlier stages, to a single bone, and the generalized tenderness of scorbutus fails to develop. Osteitis is also a disease without great hemorrhagic tendency and runs a characteristic febrile course. Furthermore, radiographs of these varying conditions are pathognomonic.

In 1909, Riesenfeld reported a case with accompanying radiographs in which there were subperiosteal hemorrhages and changes in the epiphyses. He described the latter as "a horizontal irregular shadow seen at the epiphyseal line and giving the end of the shaft a distictly hammered out appearance." Talbot, Dodd and Petersen, studying the radiographic appearances of experimental scurvy in guinea pigs, arrived at the conclusion that the "white line," first described by Frankel, is a constant sign of the disease and that it persists long after clinical recovery, indicating a slow process of repair.

It is our belief that the white line is of no great consequence in making a diagnosis in the early cases. The early radiographic picture reveals little more than subperiosteal hemorrhages. This condition is shown on Plate I. The hemorrhage is followed by proliferation of bone tissue as is indicated on Plate II. If the hemorrhage has been profuse, particularly along the shaft of the bone, there is a subperiosteal new bone formation which varies in amount with the extent of the bleeding. This condition is well illustrated by Plate III which also shows the "white line" of Frankel.

The facts here presented warrant the conclusion that scurvy is not rare amongst children who live in the vicinity of San Francisco. Most of the cases come to the clinics undiagnosed, a state of affairs which suggests that the less evident subacute cases are being overlooked. It is the hope of the writers that this paper may emphasize the need of a close scrutiny of young children in a search for the "fruste" forms of scorbutus.

We are indebted to Professors Cheney and Yerington of Stanford University Medical School and to Doctors Holsclaw and Fleischner of the Children's Hospital and Dr. Adelaide Brown for the opportunity to study their records.

The radiographs are by Doctors Bailie and Chamberlain of the Children's Hospital; case records from the service of Doctors Porter and Holsclaw.

410 Schroth Building.
1015 Investment Building.

A CASE OF TETANUS SUCCESSFULLY TREATED BY ANTITOXIN.*

By H. P. JACOBSON, M. D., Los Angeles.

In view of the uncertainty that still seems to exist as to the appropriate treatment of tetanus, and because of the desirability of putting all cases of recovery on record, the following case may prove of interest. It represents a type which required heroic measures, and in which vigorous serum treatment administered alternately intraspinally, intravenously and locally has brought about a rapid and complete recovery.

The history of the case is as follows:

S. L., male, aged 12 years—American born of Armenian parentage, previously has never had any serious illness. His present illness dates from November 22nd. 1918, when he stepped upon a rusty nail, receiving a slight superficial wound in the plantar surface of the right foot. The injury was attended by the mother and left to heal by itself. Seven days after injury the patient began to complain of stiffness and some pain in the neck, which progressed rapidly and extended to the muscles of the jaw. On November 30th his jaw began to be stiff and interfered with opening and closing of the mouth. By that time the family had decided to call a physician, who diagnosed the case as tetanus, and administered 1500 units of antitetanic serum subcutaneously and promised the family to return the following day. For some reason the physician did not return, and the patient meanwhile grew rapidly worse. The writer was called on December 2nd, about 4 p. m.

The patient was in bed suffering from excruciating pains, restless and scared. Upon my approaching the bedside he was seized with convulsions lasting about a minute, returning at frequent and irregular intervals and accompanied with a profuse perspiration. The forehead was wrinkled, angles of the mouth retracted, the head thrown backward, producing the typical sardonic grin. The jaws were completely locked. The muscular contractions were generalized, extending over the whole body and giving a board-like sensation to touch. The forearms were flexed upon the arms and rigidly fixed with clenched fists. The spine was arched forward, producing a sharp concavity on the posterior aspect of the trunk. The lower extremities were extended and completely fixed. The Kernig sign was very marked, and deep tendon reflexes very much exaggerated. Babinsky and Oppenheim signs were negative. The patient was removed to the hospital where the following treatment was acrried out:

Dec. 2nd, 7:30 p. m. Lumbar puncture was made, but no fluid withdrawn. 10,000 units of antitetanic serum administered intraspinally. The in-

*Read before the Forty-eighth Annual Meeting of the Medical Society, State of California, Santa Barbara, April, 1919.